Nos. 6 and 11, of Vol. II. of the MONTHLY are exhausted. As we have yet a few orders for complete sets to fill, we shall be pleased to pay 40 cents apiece for copies of No. 6, Vol. II., and 30 cents apiece for copies of No. 11. There has been, of late, quite a demand for complete sets for College and University libraries. Whenever a sufficient number of orders are received to defray the expenses these numbers will be reprinted. Other numbers in other volumes of the MONTHLY are nearly exhausted. Subscribers desiring numbers to complete their files should order them at once.

In order to increase our subscription list for next year, we will allow each old subscriber who secures one new subscriber to remit us three dollars in full payment for one year's subscription to the MONTHLY for both.

BOOKS AND PERIODICALS.

Lectures on Elementary Mathematics. By Joseph Louis Lagrange. Being a course of lectures delivered at the École Normale, Paris, 1795. Translated from the French by Thomas J. McCormack. 8vo. Handsomely bound in Red Cloth. xvi+156 pages. Price, $1.00. Chicago: The Open Court Publishing Co.

In bringing out this valuable translation, the translator deserves great praise. These lectures which were delivered in 1795 and which are now found in the 7th volume of Lagrange's collected works have never before been published in separate form either in French or English, though a translation in German by Niedermüller appeared in 1880. These lectures are the source from which many of the best discussions of elementary mathematics have been drawn, besides containing much of great value and interest not yet incorporated in the text books. These lectures have received the indorsement of De Morgan, and Dühaing places them in the front rank of elementary expositions, as an exemplar of their kind.

The lectures discuss the theory of *Continued Fractions*, *Logarithms*, the *Operations of Arithmetic*, and fundamental principles generally. A brief *history of Algebra* is given and a full discussion of *equations of the third and fourth degree*, including the irreducible case. The two final lectures are devoted to the resolution of numerical equations, and to the usage of curves in the solution of problems.

Teachers of elementary mathematics, who desire to improve their methods of instruction, adding richness and vitality to the subject, should read this book. B. F. F.

A Manual of Experiments in Physics. Laboratory Instruction for College Classes. By Joseph S. Ames, Ph. D., Associate Professor of Physics in Johns Hopkins University, and William J. A. Bliss, Ph. D., Associate in Physics in Johns Hopkins University. 8vo. Cloth. 544 pages. New York: Harper & Brothers.

To my mind, this is by far the best laboratory manual that has appeared. B. F. F.

Elements of the Differential Calculus. By James McMahon, A. M. (Dublin), Assistant Professor of Mathematics in Cornell University, and Virgil Sny-

der, Ph. D. (Göttingen), Instructor in Mathematics in Cornell University. 8vo. Cloth. xiv+337 pages. Price, \$2.00. New York, Cincinnati, and Chicago: American Book Co.

This book is the second of the Cornell Mathematical Series, of which series, Lucien Augustus Wait, Senior Professor of Mathematics in Cornell University, is editor.

The authors' apology for writing the book is that no other book has just the scope of this one, many of the works being too brief, and omitting rigorous proofs as being too difficult for the average student, while the more extensive treatises have too much for a student to master in the allotted time.

The authors have been very explicit in dealing with the fundamental principles of the science, and their efforts to reduce these principles to such clear and concise statements as to be readily comprehended by the student, will be greatly appreciated.

On page 59 we find the following method of differentiating $\log_a x$:

Let $y=\log_a x$. Then $y+\Delta y=\log_a(x+\Delta x)$.

$$\frac{\Delta y}{\Delta x}=\frac{\log_a(x+\Delta x)-\log_a x}{\Delta x}$$

$$=\frac{1}{\Delta x}\log_a\left(\frac{x+\Delta x}{x}\right)=\frac{1}{x}\cdot\frac{x}{\Delta x}\log_a\left(1+\frac{\Delta x}{x}\right)=\frac{1}{x}\log_a\left(1+\frac{\Delta x}{x}\right)^{x/\Delta x}.$$

. . . .

$$\frac{dy}{dx}=\frac{1}{x}\lim_{\Delta x\doteq 0}\left[\log_a\left(1+\frac{\Delta x}{x}\right)\right]^{x/\Delta x}=\ldots\ldots\frac{1}{x}\log_a e.$$

It is then stated in a foot-note that this method is too brief to be rigorous, it assuming that $x/\Delta x$ is a positive integer, which is equivalent to restricting Δx to approach zero in a particular way. A rigorous and general proof is given in the Appendix, page 316, in which the above restriction is avoided. However, while the method of proof there given is rigorous, we believe the following to be equally so:

Let $y=\log_a x$, $a>1$. Then $y\pm\Delta y=\log_a(x\pm\Delta x)$,

the upper signs corresponding and the lower signs corresponding.

$$\therefore\ \pm\Delta y=\log_a(x\pm\Delta x)-\log_a x=\log_a\left(1\pm\frac{\Delta x}{x}\right).$$

$$\frac{\Delta y}{\Delta x}=\pm\frac{1}{\Delta x}\log_a\left(1\pm\frac{\Delta x}{x}\right)=\pm\frac{1}{\Delta x}\cdot\frac{x}{x}\log_a\left(1\pm\frac{\Delta x}{x}\right)=\frac{1}{x}\log_a\left(1\pm\frac{\Delta x}{x}\right)^{\pm(x/\Delta x)}$$

$$\therefore\frac{dy}{dx}=\frac{1}{x}\lim_{\Delta x\doteq 0}\log_a\left(1\pm\frac{\Delta x}{x}\right)^{\pm(x/\Delta x)}=\frac{1}{x}\lim_{\Delta x\doteq 0}\log_a\left[\left(1^{\pm(x/\Delta x)}+\left(\pm\frac{x}{\Delta x}\right)\left(\pm\frac{x}{\Delta x}\right)\right.\right.$$

$$+\frac{1}{2!}\left(\pm\frac{x}{\Delta x}\right)\left(\pm\frac{x}{\Delta x}-1\right)\left(\pm\frac{\Delta x}{x}\right)^2+\frac{1}{3!}\left(\pm\frac{x}{\Delta x}\right)\left(\pm\frac{x}{\Delta x}-1\right)\left(\pm\frac{x}{\Delta x}-2\right)\left(\pm\frac{\Delta x}{x}\right)^3$$

$$\left.+,\text{ etc.}\right]=\frac{1}{x}\lim_{\Delta x\doteq 0}\log_a\left[1+1+\frac{1}{2!}\left(1\mp\frac{\Delta x}{x}\right)+\frac{1}{3!}\left(1\mp\frac{\Delta x}{x}\right)\left(1\mp\frac{\Delta x}{x}\right)+,\text{ etc.}\right]$$

$$=\frac{1}{x}\log_a\left[1+1+\frac{1}{2!}+\frac{1}{3!}+\frac{1}{4!}+,\text{ etc.}\right]=\frac{1}{x}\log_a e.$$

Δx is independent of x and can approach 0 in two ways only, viz., either from the left or from the right.

The same method holds when $a<1$, in which case $dy/dx=(1/x)\log_a(1/e)$.

The work is an excellent one and it together with the Integral Calculus of this series will make a most valuable course in this subject. We very heartily recommend this work to the consideration of teachers desiring something new and at the same time good.

B. F. F.